Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221

ENTERED

JUL 15 2004

Mr. Steve Zappe, WIPP Project Leader
Hazardous Waste Permits Program
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
2905 E. Rodeo Park Drive, Bldg. 1
Santa Fe, NM 87505

Subject: Transmittal of Approved Hanford WSPF Number RLMHASH.001, Transuranic Inorganic Homogeneous Solid Waste

Dear Mr. Zappe:

The Department of Energy, Carlsbad Field Office (CBFO) has approved the Hanford Waste Stream Profile Form (WSPF) RLMHASH.001.

Enclosed is a copy of the approved form as required by Section B-4(b)(1) of the WIPP Hazardous Waste Facility Permit No. NM4890139088-TSDF.

If you have any questions on this matter, please contact me at (505) 234-7357 or (505) 706-0066.

Sincerely,

Kerry W. Watson
CBFO Assistant Manager
Office of National TRU Program

Enclosure

cc: w/o enclosure
J. Kieling, NMED
C. Walker, TechLaw
M. Strum, WTS
R. Chavez, WRES
L. Greene, WRES
WIPP Operating Record
S. Calvert, CTAC
CBFO M&RC

CBFO:NTP:KWW:VW:04-1189:UFC:5822

040738

WIPP WASTE STREAM PROFILE FORM

Waste Stream Profile Number: RLMHASH.001
Generator Site Name: Hanford Technical Contact: Scott Bisping
Generator Site EPA ID: WA7890008967 Technical Contact phone number: 509-372-0851
Date audit report approved by NMED: June 23, 2000; recertified February 1; 2002, August 8, 2002; February 25, 2003; December 5, 2003; and July 2, 2004
Title, version number, and date of documents used for WAP certification: HNF-2599, Hanford Site Transuranic Waste Characterization Quality Assurance Project Plan, Rev. 10 (10/08/03); DOE/WIPP-02-3122, CH-TRU Waste Acceptance Criteria, Rev. 0.1, (07/25/02); HNF-2600, Hanford Site Transuranic Certification Plan, Rev. 12 (10/28/03); "Safety Analysis Report for the TRUPACT-II Shipping Package", Docket No. 9218, Rev. 19A (03/02), TRUPACT-II Authorized Methods for Payload Control (TRAMPAC), Rev. 19c (04/03); WIPP Waste Acceptance Criteria, DOE/WIPP-069, Rev. 7, November 1999
Did your facility generate this waste? X Yes__ No If no, provide the name and EPA ID of the original generator: _____

Waste Stream Information
WIPP ID: RLMHASH.001 Summary Category Group: S3000
Waste Matrix Code Group: Inorganic homogeneous solids Waste Stream Name: MHASH01
Description from the WTWBIR[1]: RL-W409; The waste stream is from facility cleanout and D&D of the Plutonium Finishing Plant and Plutonium Processing Facility.
Defense Waste: [X] Yes ☐ No Check one: [X] CH ☐ RH Number of SWBs: N/A Number of Drums: 291 55-gal. drums
Number of Canisters: N/A
Data package numbers supporting this waste stream characterization: See page 13 of 14
List applicable EPA Hazardous Waste Codes[2]: D005, D006, D007, D008, D011
Applicable TRUCON Content Codes: RH130E, RH130F, RH130G, RH130H

Acceptable Knowledge Information

Required Program Information

- Map of site: Reference 1
- Facility mission description: Reference 1
- Description of operations that generate waste: References 1, 2, and 3
- Waste identification/categorization schemes: Reference 1
- Types and quantities of waste generated: References 1, 2, and 3
- Correlation of waste streams generated from the same building and process, as appropriate: Reference 1
- Waste certification procedures: References 1 and 2

Required Waste Stream Information

- Area(s) and building(s) from which the waste stream was generated: References 2 (Figure A-1) and 3
- Waste stream volume and time period of generation: Reference 2
- Waste generating process description for each building: References 2 and 3
- Process flow diagrams: References 2 (Figures A-2 and A-3) and 3 (Figure A-1)
- Material inputs or other information identifying chemical/radionuclide content and physical waste form: References 1 and 3
- Which Defense Activity generated the waste: (check one): References 2 and 3

☐ Weapons activities including defense inertial confinement fusion
☐ Verification and control technology
X Defense nuclear waste and material by-products management
☐ Defense nuclear waste and materials security and safeguards and security investigations
☐ Naval reactors development
☐ Defense research and development
☐ Defense nuclear materials production

Supplemental Documentation:

- Process design documents: N/A
- Standard operating procedures: N/A
- Safety Analysis Reports: N/A
- Waste packaging logs: N/A
- Test plans/research project reports: Note 3
- Site data bases: N/A
- Information from site personnel: Note 3
- Standard industry documents: N/A
- Previous analytical data: Note 3
- Material safety data sheets: N/A
- Sampling and analysis data from comparable/surrogate waste: Note 3
- Laboratory notebooks: N/A

Sampling and Analysis Information

Radiography: N/A

Visual Examination: N/A

Visual Examination Technique: ZO-160-080, "Pipe-N-Go Operations," Rev. C, change 4, July 13, 2001

Headspace Gas Analysis

VOCs: DO-080-009, "Obtain Headspace Gas Samples of TRU Waste Containers," Rev. J-0, April 14, 2003; LA-523-410, "Determination of Volatile Organic Compounds in TRU/Mixed Waste Container Headspace," Rev. K-0, April 7, 2003; LO-080-407, "Cleaning Summa Canisters for TRU Headspace Gas Sampling," Rev. G-O, April 8, 2003; LO-090-450, "TRU Project Sample Chain of Custody, Storage, Acceptance, and Disposal," Rev. F-0, April 8, 2003.

Flammable: DO-080-009, "Obtain Headspace Gas Samples of TRU Waste Containers," Rev. J-0, April 14, 2003; LA-523-410, "Determination of Volatile Organic Compounds in TRU/Mixed Waste Container Headspace," Rev. K-0, April 7, 2003

Other gases (specify): N/A

Homogeneous Solids/Soils/Gravel Sample Analysis

Total metals: ACMM-8909, "Microwave Assisted Digestion of Homogeneous Solids and Soil/Gravel," Rev. 7, April 7, 2003; ACMM-2901, "Determination of Metals by ICP-AES for TRU Waste Characterization," Rev. 2, April 7, 2003; ACMM-2810 "Determination of Mercury by CVAA for TRU Waste Characterization," Rev. 2, April 7, 2003

PCBs: N/A

VOCs: ACMM-9260, "Volatile Organic Compounds by Gas Chromatography Mass Spectrometry," Rev. 9, July 10, 2003

Nonhalogenated VOCs: ACMM-9441, "Determination of Nonhalogenated Volatile Organics by Gas Chromatography," Rev. 8, April 7, 2003

Semi-VOCs: ACMM-9500, "Sample Preparation for Semivolatile Organic Compounds and Polychlorinated Biphenyls," Rev. 8, July 10, 2003; ACMM-9270, "Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry," Rev. 5, April 7, 2003

Other (specify): Not Applicable

Waste Stream Profile Form Certification:

I have reviewed the information in this Waste Stream Profile Form and have found the information consistent with the information in the analytical batch data reports.

M. J. Horhota — Signature of SQAO

M.J. Horhota, Site Quality Assurance Official — Printed Name and Title

7/8/04 — Date

NOTE:
(1) This waste stream is identified in the WTWBIR as RL-W409; the WIPP ID assigned corresponds to the WSPF number.
(2) AK, visual examination technique, headspace gas analysis, and/or homogeneous solids/soils/gravel sample analysis were used to determine EPA Hazardous Waste Codes. The attached signed summary reports document this determination.
(3) See Section 5 of M4T00-TRU-03-534 for a list of supplemental references used to compile AK. This section provides records management system tracking numbers, document titles, revision numbers, dates, authors, and a brief summary of waste stream-specific supplemental AK information documentation.

I hereby certify that I have reviewed the information in this Waste Stream Profile Form, and it is complete and accurate to the best of my knowledge. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

R P Dunn — Signature of Site Project Manager

R. P. Dunn, Hanford TRU Program Director — Printed Name and Title

7/8/04 — Date

REFERENCE LIST

1. HNF-3461, "Hanford Site Transuranic Waste Management Program Acceptable Knowledge Document for Retrievably Stored Contact-Handled Waste," Rev. 7, June 18, 2002.
2. HNF-5482, "Hanford Site Transuranic Waste Management Acceptable Knowledge Documentation for the Plutonium Finishing Plant," Rev. 8, December 12, 2003.
3. M4T00-TRU-03-534, "Transmittal of the Waste Stream-Specific Document MHASH01 Revision 3 for the Acceptable Knowledge Documentation Management Program for the Hanford Incinerator Ash, Waste Stream MHASH01," December 2, 2003.
4. M4T00-DCD-03-074, "Transmittal of the Random Selection of Containers for Reduced Headspace Gas Sampling and Analysis Campaigns for Waste Streams Rocky Flats Ash, RFETS01, Sand Slag and crucible, SS&C01, and Hanford Ash, MHASH01," April 9, 2003.
5. M4T00-DCD-03-488.1 "Data Quality Objectives Reconciliation, Headspace Gas Analysis Report, Flammable VOC Report and Statistic Analysis of Solids Sampling Analytical Data Report for Waste Stream MHASH01, For 15 Containers." March 17, 2004.
6. 3T000-PLC-01-040 "Hanford Ash Random RCRA Sample Selection", March 15, 2001
7. M4T00-DCD-03-161 R1 "Random Reselection of Previously Selected Hanford Ash Items and Random Grid Selection

TABLE 1, RECONCILIATION WITH DATA QUALITY OBJECTIVES

I certify by signature (below) that sufficient data have been collected to determine the following project-required waste parameters for WSPF#: RLMHASH.001

Site Project Office Letter Report #(s): M4T00-DCD-03-488.1

		Reconciliation Parameter
1	X	Waste Matrix Code as reported in WWIS.
2	X	Waste Material Parameter Weights for individual containers as reported in WWIS.
3	X	The matrix parameter category identified is consistent with the type of sampling and analysis used to characterize the waste.
4	X	Container mass and activities of each radionuclide of concern as reported in WWIS.
5	X	Appropriate packaging configuration and DAC were met and documented in the headspace gas sampling documentation and the drum age was met prior to sampling.
6	X	The TRU activity reported in WWIS demonstrates with a 95% probability that the waste is TRU waste and not low-level radioactive waste.
7	X	Mean concentrations, UCL_{90} for the mean concentrations, standard deviations, and the number of samples collected for each VOC in headspace gas of the waste containers in the waste stream/waste stream lot were assigned as required.
8	X	Identify VOCs and quantify the concentrations of VOC constituents in the total waste inventory to ensure compliance with the environmental performance standards of 20.4.1.500 NMAC (incorporating 40 CFR 11§264.601(c)), and to confirm hazardous waste identification by acceptable knowledge.
9	X	Mean concentrations, UCL_{90} for the mean concentrations, standard deviations, number of samples collected for VOCs were calculated and compared with the program required quantitation limits and regulatory threshold limits, as reported in Data Summary Report Table 5, and EPA Hazardous Waste Codes were assigned as required (Matrix Parameter Summary Categories S3000 and S4000).
10	X	Mean concentrations, UCL_{90} for the mean concentrations, standard deviations, number of samples collected for SVOCs were calculated and compared with the program required quantitation limits and regulatory threshold limits, as reported in Data Summary Report Table 6, and EPA Hazardous Waste Codes were assigned as required (Matrix Parameter Summary Categories S3000 and S4000).
11	X	Mean concentrations, UCL_{90} for the mean concentrations, standard deviations, number of samples collected for metals were calculated and compared with the program required quantitation limits and regulatory threshold limits, as reported in Data Summary Report Table 4, and EPA Hazardous Waste Codes were assigned as required (Matrix Parameter Summary Categories S3000 and S4000).
12	X	Sufficient numbers of samples (as established by completeness rate) were taken to meet statistical sampling requirements, as documented on Summary Data Report Table 3.
13	X	Only validated data were used in the above calculations, as documented through the site data review and validation forms and process.
14	X	Waste containers were selected randomly for sampling, as documented in site procedures.
15	X	The potential flammability of TRU waste headspace gases.
16	X	Whether the waste stream exhibits a toxicity characteristic under 40 CFR Part 261, Subpart C.
17	X	Whether the waste stream can be classified as hazardous or nonhazardous at the 90% confidence level.
18	X	Whether all TICs were appropriately identified and reported in accordance with the requirements of the QAPjP Section B3-1.
19	X	Whether the overall completeness, comparability, and representativeness QAOs were met for each of the analytical and testing procedures as specified in the QAPjP Sections B3-2 through B3-9.
20	X	Whether the PRQLs for all analyses were met.
21	N/A	Sufficient numbers of waste containers were visually examined to determine with a reasonable level of certainty that the UCL_{90} for the miscertification rate is less than 14 percent.

Check (**X**) indicates that data or acceptable knowledge are sufficient to determine the waste parameters and that the waste parameters have been reported in the listed document or database. N/A indicates parameter does not apply to waste stream.

Signature of Site Project Manager

Richard P. Dunn
Printed Name

7/8/04
Date

TABLE 2, DATA SUMMARY REPORT: HEADSPACE GAS SUMMARY DATA

WSPF #: RLMHASH.001
Site Project Office Letter Report #: M4T00-DCD-03-488.1

ANALYTE	# samples with detectable conc.[a]	Transform applied [a, b]	Normality test [a, b] (pass/fail)	Mean [b] (ppmv)	SD [b, c] (ppmv)	UCL_{90} [b, c] (ppmv)	Transformed PRQL [a, b]	PRQL (ppmv)	EPA Code [d, e] (F001-F005); (D004-D043)
1,1,1-Trichloroethane	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
1,1,2-Trichloro-1,2,2-trifluoroethane	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Acetone	0	N/A	N/A	5.00	0.00	N/A	N/A	100	N/A
Benzene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Butanol	0	N/A	N/A	5.00	0.00	N/A	N/A	100	N/A
Carbon disulfide	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Carbon tetrachloride	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Chlorobenzene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Chloromethane	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Ethyl benzene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Ethyl ether	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
m or p-Xylene[f]	0	N/A	N/A	2.00	0.00	N/A	N/A	10	N/A
Methanol	1	none	N/A	5.8	2.53	N/A [g]	N/A	100	N/A
Methyl ethyl ketone	0	N/A	N/A	5.00	0.00	N/A	N/A	100	N/A
Methyl isobutyl ketone	0	N/A	N/A	5.00	0.00	N/A	N/A	100	N/A
Methylene chloride	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
o-Xylene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Tetrachloroethylene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Toluene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Trichloroethylene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
1,1,2,2-Tetrachloroethane	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
1,1-Dichloroethane	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
1,1-Dichloroethylene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
1,2-Dichloroethane	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Bromoform	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Chloroform	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
cis-1,2-Dichloroethylene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
trans-1,2-Dichloroethylene	0	N/A	N/A	1.00	0.00	N/A	N/A	10	N/A
Cyclohexane [h]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trimethylbenzene [h]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,3,5-Trimethylbenzene [h]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hydrogen[i]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 2, DATA SUMMARY REPORT: HEADSPACE GAS SUMMARY DATA (Concluded)

WSPF #: RLMHASH.001
Site Project Office Letter Report #: M4T00-TRU-03-488.1

ADDITIONAL TARGET ANALYTE [j]	# Samples [j]	Mean (ppmv) [j]
N/A	N/A	N/A

TENTATIVELY IDENTIFIED COMPOUNDS [k]	Maximum Observed Estimated Concentrations (ppmv) [k]	# Samples Containing TIC [k]
N/A	N/A	N/A

Did the data verify the acceptable knowledge? **[X]** Yes [] No
If not, describe the basis for assigning the EPA Hazardous Waste Codes:

Signature of WSPF Preparer | S. W. Bisping Printed Name | 7/8/04 Date

NOTES:

[a] A total of 10 random samples were analyzed. Although there was a single detectable concentration above the method detection limit (MDL), transformation of the data was unnecessary. Based on the single detected value, the calculated number of samples (*n*) required for analysis was less than the 10 samples collected. This waste stream qualifies for reduced headspace gas sampling because it meets the criteria established in the WIPP Hazardous Waste Facility Permit Section B-3a(1)(ii) (M4T00-DCD-03-074).

[b] N/A indicates no detectable measurements available for statistics. Based upon the fact that the analytes were reported as LTD in all 10 samples, we can conclude that their median concentrations are all less than the reported LTDs with 99.99+% ($1 - 0.5^{10}$) confidence and, as such, well less than the Program Required Quantitation Limit (PRQL).

[c] Because there was no variance in the reported analyte values, there is no standard deviation. Therefore the calculation for UCL_{90} is not meaningful for statistical analysis. Comparison of the mean with the PRQL revealed no cases where any analyte exceeded the PRQL value.

[d] N/A in this column indicates no associated EPA Hazardous Waste Number assigned to the waste stream.

[e] Listed and toxic characteristic codes include only those that are listed in the WIPP hazardous waste facility permit.

[f] m-Xylene and p-xylene cannot be distinguished as a single analyte in the laboratory and are reported as such.

[g] UCL_{90} and standard deviation values are calculated using detectable concentrations (J and D flags and unflagged data) with at least one degree of freedom. Because there was only a single detect for methanol, and because degrees of freedom equals n – 1, a UCL_{90} could not be calculated.

[h] These compounds are from the TRAMPAC and are flammable VOCs that do not appear in the QAPjP or the WIPP WAP. These are in the current analytical library, but are not part of the target analyte list. Samples were analyzed for these compounds and would be reported if detected.

[i] Hydrogen will only be sampled as necessary to support aspiration criteria as shown in WMP-400, Section 7.1.7. This analysis confirms that flammable VOCs in the payload container headspace are not expected to exceed 500 ppm.

[j] N/A indicates no additional target analytes.

[k] There were no tentatively identified compounds (TICs) detected in greater than 25% of the headspace gas samples for this waste stream. N/A indicates that no TICs were observed.

WSPF #: RLMHASH.001
Site Project Office Letter Report #(s): M4T00-TRU-03-488.1

Table 3, Determination of Number of Retrievably Stored Waste Containers to Sample (S3000, S4000)
Preliminary Estimates of Mean, Variance, and Coefficient of Variation: Attach a table(s) that correlates container identification numbers to data packages if different from containers used for characterization. Description of Source Data: Preliminary samples were collected and analyzed in compliance with all requirements (specified in the WIPP Waste Analysis Plan Section B2-2a). The samples collected met the requirement for being counted as part of the total number of calculated required samples. Sufficient preliminary samples were collected to demonstrate compliant sampling – ie., collection of additional samples other than the preliminary samples was not required. Samples Randomly Selected from Waste Stream (yes/no)? Yes Treatment of less-than-detectable measurements: This pertains only to data for analytes in which at least one detectable measurement was obtained. Raw data were evaluated using one half the method detection limit (MDL) for less-than-detectable observations. Analytes that are listed spent solvents and therefore not included in the calculation to determine the number of containers to sample: benzene; carbon disulfide; carbon tetrachloride; chlorobenzene; 1,2-dichlorobenzene; isobutanol; methyl ethyl ketone; methylene chloride; pyridine; tetrachloroethylene; toluene; 1,1,1-trichloroethane; 1,1,2-trichloro-1,1,2-trichloroethane; trichloroethylene; and trichlorofluoromethane. Selected coefficient of variation and associated analyte: 1.9 silver Total calculated number of containers to sample: n = 3.9 based on preliminary sample size for evaluating the waste stream. Attach preliminary estimates: See M4T00-03-488.1. Preliminary estimates are identical to final results because sufficient preliminary samples were collected and analyzed in compliance with all requirements for being used as required samples.
Retrievably Stored Waste Sampling Results
Analytes that are listed spent solvents and therefore not included in the UCL_{90} estimate calculation to determine the toxicity characteristic: benzene; carbon disulfide; carbon tetrachloride; chlorobenzene; 1,2-dichlorbenzene; isobutanol; methyl ethyl ketone; methylene chloride; pyridine; tetrachloroethylene; toluene; 1,1,1-trichloroethane; 1,1,2-trichloro-1,2,2-trifluoroethane; 1,1,2-trichloroethane; trichloroethylene; and trichlorofluoromethane Largest Coefficient of Variation and associated analyte: 1.9 silver Comparison of largest coefficient of variation with coefficient of variation selected from preliminary estimate: 1.9 silver Calculated sample size = 3.9 Preliminary sample size exceeds largest calculated sample size. Treatment of less-than-detectable measurements: This pertains only to data for analytes in which at least one detectable measurement was obtained. Raw data were evaluated using one half the method detection limit (MDL) for less-than-detectable observations. Transformations applied to data and justification: Transformations were not applied to data for UCL_{90} comparison to less than detectable values. Drums overpacked for shipment/WWIS tracking (Yes/No)? No If yes, overpack container identification number: N/A Sampled drums included in waste stream lot reported here (Yes/No)? Yes If no, WSPF # including sampled drums:
Newly Generated Waste Sampling Results
Batch or continuous process? NA [1] Samples randomly selected from Waste Stream? (yes/no) NA [1] Sample locations (part of process): NA [1] Treatment of less-than-detectable measurements: NA [1] Transformations applied to data and justification: NA [1]

[1] Control charting for this waste stream was determined not to be applicable and sampling and analysis was conducted using a retrievable stored characterization strategy.

Signature of WSPF Preparer | Scott Bisping, Printed Name | 7/8/04, Date

TABLE 4, DATA SUMMARY REPORT: METALS SUMMARY DATA

WSPF #: RLMHASH.001
Site Project Office Letter Report #(s): M4T00-TRU-03-488.1

ANALYTE	# Samples above MDL	Transform applied	Normality test (pass/fail)	Mean [a, b] (mg/kg)	SD [a, b] (mg/kg)	UCL_{90} [a, b] (mg/kg)	Transformed PRQL [a, b]	PRQL [a, b] (mg/kg)	EPA Code [c] (D004-11)
Antimony	5	ln	fail	122.9	179.5	4.83	4.61	100	N/A
Arsenic	5	ln	pass	2.9	1.9	1.35	4.61	100	N/A
Barium	5	ln	pass	466.0	248.9	6.4	7.60	2000	D005
Beryllium	5	ln	fail	64.5	94.1	4.13	4.62	100	N/A
Cadmium	5	none	pass	46.4	33.7	69.5	N/A	20	D006
Chromium	5	ln	fail	692.0	724.0	6.85	4.61	100	D007
Lead	5	none	pass	970.0	650.8	1416.3	N/A	100	D008
Mercury	0	ln	N/A	0.0	0.0	N/A	1.61	4	N/A
Nickel	5	ln	fail	4100.0	2437.2	8.59	4.62	100	N/A
Selenium	0	ln	fail	0.4 [d]	0.1 [d]	N/A	9.21 [d]	20	N/A
Silver	5	ln	fail	45.5	86.4	3.76	3.08	100	D011 [e]
Thallium	4	ln	fail	1.2	0.6	1.25	3.08	100	N/A
Vanadium	5	ln	fail	24.6	33.0	3.64	3.13	100	N/A
Zinc	5	ln	fail	1768.0	1796.2	7.77	3.02	100	N/A

Did the data verify the acceptable knowledge? [X] Yes ☐ No

If not, describe the basis for assigning the EPA Hazardous Waste Codes.

Signature of WSPF Preparer | S. W. Bisping Printed Name | 7/8/04 Date

NOTES:

[a] A total of 5 samples were analyzed for each analyte. Statistics calculated based on raw data using ½ the minimum detection limit (MDL) values for all less-than-detectable observations without transforming these values. Data were tested for normality using the Shapiro-Wilk test and transformed as necessary. A best fit for normality was achieved for cadmium and lead using untransformed data and normality was found. Normality was achieved using a lognormal transformation for arsenic and barium.

[b] N/A entries indicate that there is insufficient information available to perform the statistics.

[c] N/A in this column indicates that associated EPA HWN codes were not assigned or do not exist. EPA codes have been assigned on the basis of AK information (barium, cadmium, chromium, and lead). No AK re-evaluation or re-assignment of HWNs were required for any of these constituents.

[d] Although no positive analytical detects were identified, statistics were calculated using one-half the elevated method detection limits associated with this data, resulting in the results presented.

[e] Although silver was not identified in the acceptable knowledge for this waste stream, a reevaluation of the AK was performed and is documented in M4T00-TRU-03-488.1. The EPA hazardous waste number (D011) has been applied based on the results of the sampling and reevaluation.

Source: QAPjP, Table B3-8

TABLE 5, DATA SUMMARY REPORT: TOTAL VOC SUMMARY DATA

WSPF #: RLMHASH.001

Site Project Office Letter Report #(s): M4T00-TRU-03-488.1

ANALYTE	# Samples above MDL[a]	Transform appled [b]	Normality test (pass/fail) [b]	Mean [b] (mg/kg)	SD [b] (mg/kg)	UCL_{90} [b] (mg/kg)	Transformed PRQL[b]	PRQL (mg/kg)	EPA Code [c] (F001-005, D018-040, 043)
Benzene	0	N/A	N/A	0.46	0.22	0.610	N/A	10	NA
Bromoform	0	N/A	N/A	0.22	0.02	0.239	N/A	10	NA
Carbon disulfide	0	N/A	N/A	0.22	0.02	0.239	N/A	10	NA
Carbon tetrachloride	0	N/A	N/A	0.37	0.04	0.400	N/A	10	NA
Chlorobenzene	0	N/A	N/A	0.22	0.02	0.239	N/A	2,000	NA
Chloroform	0	N/A	N/A	0.22	0.02	0.239	N/A	120	NA
1,4-Dichlorobenzene	See SVOC table								
ortho-Dichlorobenzene	See SVOC table								
1,2-Dichloroethane	0	N/A	N/A	0.22	0.02	0.239	N/A	10	NA
1,1-Dichloroethylene	0	N/A	N/A	0.22	0.02	0.239	N/A	14	NA
trans-1,2-Dichloroethylene	0	N/A	N/A	0.37	0.04	0.400	N/A	10	NA
Ethyl benzene	0	N/A	N/A	0.22	0.02	0.239	N/A	10	NA
Methylene chloride	0	N/A	N/A	0.51	0.33	0.736	N/A	10	NA
1,1,2,2-Tetrachloroethane	0	N/A	N/A	0.30	0.04	0.322	N/A	10	NA
Tetrachloroethylene	0	N/A	N/A	0.22	0.02	0.239	N/A	14	NA
Toluene	0	N/A	N/A	0.22	0.02	0.239	N/A	10	NA
1,1,1-Trichloroethane	0	N/A	N/A	0.22	0.02	0.239	N/A	4	NA
1,1,2-Trichloroethane	0	N/A	N/A	0.22	0.02	0.239	N/A	10	NA
Trichloroethylene	0	N/A	N/A	0.15	0.02	0.159	N/A	10	NA
Trichlorofluoromethane	0	N/A	N/A	0.22	0.02	0.239	N/A	10	NA
1,1,2-Trichloro-1,2,2-trifluoroethane	0	N/A	N/A	0.22	0.02	0.239	N/A	10	NA
Vinyl chloride	0	N/A	N/A	0.22	0.02	0.239	N/A	4	NA
m&p-Xylene	0	N/A	N/A	0.37	0.04	0.400	N/A	10	NA
o-Xylene	0	N/A	N/A	0.15	0.02	0.159	N/A	10	NA
Acetone	0	N/A	N/A	19.50	1.70	20.662	N/A	100	NA
Butanol	0	N/A	N/A	19.50	1.70	20.662	N/A	100	NA
Ethyl ether	0	N/A	N/A	29.20	2.66	31.024	N/A	100	NA
Isobutanol	0	N/A	N/A	19.50	1.70	20.662	N/A	100	NA
Methanol	0	N/A	N/A	29.20	2.66	31.024	N/A	100	NA
Methyl ethyl ketone	0	N/A	N/A	29.20	2.66	31.024	N/A	100	NA
Pyridine	0	N/A	N/A	19.50	1.70	20.662	N/A	100	NA

ADDITIONAL TARGET ANALYTE [d]	# Samples [d]	Mean (ppmv) [d]
N/A	N/A	N/A

Source: QAPjP, Table B3-4

TABLE 5, DATA SUMMARY REPORT: TOTAL VOC SUMMARY DATA (Con't)

WSPF #: RLMHASH.001
Site Project Office Letter Report #(s): M4T00-TRU-03-488.1

TENTATIVELY IDENTIFIED COMPOUNDS [e]	Maximum Observed Estimated Concentrations (ppmv) [e]	# Samples Containing TIC [e]
bis(2-ethylhexyl)phalate	1.3 mg/kg	1

Did the data verify acceptable knowledge? [X] Yes ☐ No

If no, describe the basis for assigning EPA Hazardous Waste Codes.

Signature of WSPF Preparer

S. W. Bisping
Printed Name

7/08/04
Date

5 samples

NOTES:

[a] A total of 5 samples were analyzed. When a measurement is reported as below detection, one-half the analysis method detection limit (MDL) is used without transforming these values. Note that the MDL for a given analyte may vary from sample to sample.
[b] N/A in this column indicates no detectable concentrations were observed. With no detectable concentrations, minimum sample size and UCL_{90} for analyte mean concentration is not calculable and transformations were not applied.
[c] N/A in this column indicates no EPA hazardous waste number (HWN) is applicable. EPA HWNs have been applied to the waste on the basis of acceptable knowledge.
[d] N/A indicates no additional target analytes.
[e] N/A indicates no detectable measurements available for statistics. Although bis(2-ethylhexyl)phalate was detected in a single sample (1/5 = 20%), this is less than the 25% required by the WIPP hazardous waste facility permit for addition of tentatively identified compounds to the target analyte list.

TABLE 6, DATA SUMMARY REPORT: TOTAL SVOC SUMMARY DATA

WSPF #: RLMHASH.001
Site Project Office Letter Report #(s): M4T00-TRU-03-488.1

ANALYTE	# Samples above the MDL [a]	Transform applied [b]	Normality test (pass/fail) [b]	Mean [b] (mg/kg)	SD [b] (mg/kg)	UCL_{90} [b] (mg/kg)	Transformed PRQL [b]	PRQL (mg/kg)	EPA Codes [c] (D027-38)
ortho-Cresol	0	N/A	N/A	0.20	N/A	N/A	N/A	4,000	N/A
m&p-Cresols	0	N/A	N/A	0.30	N/A	N/A	N/A	4,000	N/A
1,4-Dichlorobenzene	0	N/A	N/A	0.20	N/A	N/A	N/A	150	N/A
ortho-Dichlorobenzene	0	N/A	N/A	0.20	N/A	N/A	N/A	40	N/A
2,4-Dinitrophenol	0	N/A	N/A	0.10	N/A	N/A	N/A	2,000	N/A
2,4-Dinitrotoluene	0	N/A	N/A	0.15	N/A	N/A	N/A	2.6	N/A
Hexachlorobenzene	0	N/A	N/A	0.15	N/A	N/A	N/A	2.6	N/A
Hexachloroethane	0	N/A	N/A	0.20	N/A	N/A	N/A	60	N/A
Nitrobenzene	0	N/A	N/A	0.20	N/A	N/A	N/A	40	N/A
Pentachlorophenol	0	N/A	N/A	0.10	N/A	N/A	N/A	2,000	N/A
Pyridine	See VOC Table								
Aroclor 1016 [d]	0	N/A	N/A	NA	NA	NA	N/A	40	N/A
Aroclor 1221 [d]	0	N/A	N/A	NA	NA	NA	N/A	40	N/A
Aroclor 1232 [d]	0	N/A	N/A	NA	NA	NA	N/A	40	N/A
Aroclor 1242 [d]	0	N/A	N/A	NA	NA	NA	N/A	40	N/A
Aroclor 1248 [d]	0	N/A	N/A	NA	NA	NA	N/A	40	N/A
Aroclor 1254 [d]	0	N/A	N/A	NA	NA	NA	N/A	40	N/A
Aroclor 1260 [d]	0	N/A	N/A	NA	NA	NA	N/A	40	N/A

TARGET ANALYTE [e]	# Samples [e]	Mean (ppmv) [e]
N/A	N/A	N/A

Source: QAPjP, Table B3-6

TABLE 6, DATA SUMMARY REPORT: TOTAL SVOC SUMMARY DATA (Con't)

WSPF #: RLMHASH.001

Site Project Office Letter Report #(s): M4T00-TRU-03-488.1

TENTATIVELY IDENTIFIED COMPOUNDS [e]	Maximum Observed Estimated Concentrations (ppmv) [e]	# Samples Containing TIC [e]
N/A	N/A	N/A

Did the data verify acceptable knowledge? [X] Yes ☐ No

If no, describe the basis for assigning EPA Hazardous Waste Codes.

Signature of WSPF Preparer

S. W. Bisping
Printed Name

7/08/04
Date

NOTES:

[a] A total of 5 samples were analyzed. When a measurement is reported as below detection, one-half the analysis method detection limit (MDL) is used without transforming these values. Note that the MDL for a given analyte may vary from sample to sample.

[b] N/A in this column indicates no detectable concentrations were observed. With no detectable concentrations, minimum sample size and UCL_{90} for analyte mean concentration is not calculable.

[c] N/A in this column indicates no EPA hazardous waste number (HWN) is applicable. EPA HWNs have been applied to the waste on the basis of acceptable knowledge.

[d] Transformer oils containing polychlorinated biphenyls (PCBs) have been identified in a limited number of waste streams included in the organic sludges waste matrix code (S3200). Waste streams included in the solidified organics final waste form (and other waste streams in which AK identifies the presence of PCBs) shall be analyzed for PCBs.

[e] No entry indicates no additional target analytes or tentatively identified compounds have been identified in this waste stream.

TABLE 7, BILLET CAN/CIN/BATCH DATA REPORT CORRELATION

WSPF #: RLMHASH.001
Site Project Office Letter Report #(s): M4T00-TRU-03-488.1

Billet Can Identifier	Container Identification Number	VE Technique Batch Data Report No.	NDA Batch Data Report No.	Headspace Gas Batch Data Report No.	RCRA Analysis Metals Report No.	RCRA Analysis SVOC Report No.	RCRA Analysis NHVOC Report No.	RCRA Analysis VOC Report No.
100-01-12-341	RHZ-214-30430	PFP-VE-2001-023	PFP-TB-2001-070	WSCF-030415R0	N/A	N/A	N/A	N/A
100-01-04-031	RHZ-214-30459	PFP-VE-2001-013	PFP-TB-2001-038	WSCF-030422R0	N/A	N/A	N/A	N/A
100-01-04-039	RHZ-214-30459	PFP-VE-2001-013	PFP-TB-2001-038	WSCF-030422R0	N/A	N/A	N/A	N/A
100-01-09-171	RHZ-214-30607	PFP-VE-2001-019	PFP-TB-2001-058	WSCF-030422R0	N/A	N/A	N/A	N/A
100-01-11-264	RHZ-214-30642	PFP-VE-2001-021	PFP-TB-2001-065	WSCF-030415R0	N/A	N/A	N/A	N/A
100-01-11-268	RHZ-214-30642	PFP-VE-2001-021	PFP-TB-2001-065	WSCF-030415R0	N/A	N/A	N/A	N/A
100-01-11-269	RHZ-214-30642	PFP-VE-2001-021	PFP-TB-2001-065	WSCF-030415R0	N/A	N/A	N/A	N/A
100-01-09-154	RHZ-214-30662	PFP-VE-2001-018	PFP-TB-2001-057	WSCF-030422R0	N/A	N/A	N/A	N/A
100-01-09-157	RHZ-214-30662	PFP-VE-2001-018	PFP-TB-2001-057	WSCF-030422R0	N/A	N/A	N/A	N/A
100-02-01-446	RHZ-214-30669	PFP-VE-2002-001	PFP-TB-2002-075	WSCF-030422R0	N/A	N/A	N/A	N/A
100-02-01-447	RHZ-214-30722	PFP-VE-2002-002	PFP-TB-2002-080	WSCF-030415R0	N/A	N/A	N/A	N/A
100-02-01-448	RHZ-214-30722	PFP-VE-2002-002	PFP-TB-2002-080	WSCF-030415R0	N/A	N/A	N/A	N/A
100-01-12-443	RHZ-214-30725	PFP-VE-2002-002	PFP-TB-2002-080	WSCF-030415R0	N/A	N/A	N/A	N/A
100-01-12-444	RHZ-214-30725	PFP-VE-2002-002	PFP-TB-2002-080	WSCF-030415R0	N/A	N/A	N/A	N/A
100-01-12-421	RHZ-214-30766	PFP-VE-2002-002	PFP-TB-2002-077	WSCF-030422R0	N/A	N/A	N/A	N/A
100-01-12-422	RHZ-214-30766	PFP-VE-2002-002	PFP-TB-2002-077	WSCF-030422R0	N/A	N/A	N/A	N/A
100-02-01-467	RHZ-214-30775	PFP-VE-2002-004	PFP-TB-2002-082	WSCF-030415R0	N/A	N/A	N/A	N/A
100-02-01-514	RHZ-214-30775	PFP-VE-2002-004	PFP-TB-2002-082	WSCF-030415R0	N/A	N/A	N/A	N/A
100-03-07-014	RHZ-214-31583	PFP-VE-2003-034	PFP-TB-2003-181	N/A	ALD03022M	ALD03019S	ALD03022N	ALD03019V
100-03-07-016	RHZ-214-31583	PFP-VE-2003-034	PFP-TB-2003-181	N/A	N/A	N/A	N/A	N/A
100-03-07-018	RHZ-214-31619	PFP-VE-2003-034	PFP-TB-2003-181	N/A	ALD03022M	ALD03019S	ALD03022N	ALD03019V
100-03-07-019	RHZ-214-31619	PFP-VE-2003-034	PFP-TB-2003-181	N/A	N/A	N/A	N/A	N/A
100-03-07-022	RHZ-214-31510	PFP-VE-2003-034	PFP-TB-2003-181	N/A	ALD03022M	ALD03019S	ALD03022N	ALD03019V
100-03-07-023	RHZ-214-31506	PFP-VE-2003-034	PFP-TB-2003-181	N/A	ALD03022M	ALD03019S	ALD03022N	ALD03019V
100-03-07-024	RHZ-214-31604	PFP-VE-2003-034	PFP-TB-2003-181	N/A	ALD03022M	ALD03019S	ALD03022N	ALD03019V
100-03-07-017	RHZ-214-31604	PFP-VE-2003-034	PFP-TB-2003-181	N/A	N/A	N/A	N/A	N/A

WIPP WASTE STREAM PROFILE FORM

ACCEPTABLE KNOWLEDGE WASTE STREAM SUMMARY

WSPF #: RLMHASH.001

M4T00-TRU-03-550, Acceptable Knowledge Waste Stream Summary Form for WSPF# RLMHASH.001 (attached).

M4T00-TRU-03-550
WSPF# RLMHASH.001

ACCEPTABLE KNOWLEDGE WASTE STREAM SUMMARY FORM

Site: Hanford

Waste Stream Profile #: RLMHASH.001

Waste Stream Name/Waste Stream Lot Name: MHASH01

Waste Stream/Waste Stream Lot Number: MHASH01

Generator Site: 200 West Area; Plutonium Finishing Plant

Waste Stream Generation Building(s): Building 234-5Z

Waste Stream Volume: 60 m^3 (291 55-gal drums)

Waste Stream Generation Time Period: February 2001 – Present

TRUCON Codes: RH130E, RH130F, RH130G, RH130H

WIPP Identification Number(s): RLMHASH.001

Summary Category Group: S3000 –Homogenous Solids

Waste Matrix Code Group: Inorganic Homogenous Solids

Waste Matrix Code: Ash (S3111)

Waste Description

The Hanford ash material was generated during incineration of items for plutonium recovery. The Hanford ash material is a mixture of coarse, granular, fine, and very fine particulate materials at one time classified as a residue intended for processing via dissolution to recover plutonium. However, before this material could be processed to recover the plutonium, the demand for plutonium ended and plutonium recovery operations ceased at Hanford. The ash was subsequently declared to be waste and has been processed and packaged for eventual disposal at the Waste Isolation Pilot Plant (WIPP). The dates of generation reflect the time period during which the residues were packaged into pipe overpack containers (POCs) for disposal at WIPP, and not the period during which the ash was originally generated. The Hanford ash materials are currently in storage at the Central Waste Complex (CWC) awaiting shipment to the WIPP for disposal.

TRU WASTE MANAGEMENT

The Hanford ash materials were generated during incineration of materials for plutonium recovery. Ash generated during this incineration was collected in feed cans (one-quart capacity, steel, food-pack type cans, seven-inch cans, and lard cans). For plutonium recovery, these feed cans were placed into dissolvers, the cans and their contents dissolved, and the plutonium recovered from the resultant solutions. However, before the ash materials in this waste stream were processed to recover the plutonium, the demand for plutonium ceased and the ash materials were declared to be waste.

Subsequent to the end of plutonium recovery processing, the Hanford ash materials have been packaged into POCs in preparation for storage at the CWC. During this final packaging, the material was removed from feed cans, sieved, and loaded into billet cans. This packaging operation included blending the ash with surrogate material (silica sand only) for safeguards purposes. Also at this time, Plutonium Finishing Plant (PFP) personnel performed the Visual Examination (VE) technique, following the "Pipe-N-Go Operations" procedure (ZO-160-080), to confirm the material parameters and waste matrix code, and to confirm that there were no prohibited items.

Transuranic Waste Baseline Inventory Report

The Hanford ash waste stream contained (before packaging) recoverable amounts of plutonium and was originally considered a processing residue rather than a waste. Following its designation as a waste, processing and packaging for disposal, and removal from PFP as a waste, the Hanford ash waste stream was assigned Transuranic Waste Baseline Inventory Report (TWBIR) identification number RL-W409. The description of RL-W409 includes a variety of noncombustible and combustible wastes generated during cleanout and decontamination and decommissioning (D&D) of the PFP and Plutonium Processing Facility. Although this material is not specifically identified in the TWBIR waste source description, the ash is a D&D waste generated from 234-5Z Building cleanout and as such is part of the RL-W409 waste stream.

Waste Matrix Codes

The Summary Category Group determined for the waste stream is S3000, Homogeneous Solids, and the Waste Matrix Code is S3111, Ash. The Waste Matrix Code Group is inorganic homogeneous solids. The Hanford ash material is a mixture of coarse, granular, fine, and very fine particulate materials. Silica sand was added to the material as a surrogate compound during final packaging in preparation for shipping to WIPP.

Material Disposition

The aggregate plutonium concentration of incinerator ash in PFP inventory was approximately 10.6 weight percent before repackaging of the waste for shipment (Hoyt et al. 2000). The incorporation of surrogate materials during packaging of the waste for shipment to WIPP has reduced all individual waste item (i.e., billet can) plutonium concentrations to below 8 percent by weight in accordance with procedure ZO-160-080, "Pipe-n-Go Operations." This complies with the fiscal year (FY) 1999 Energy and Water Development Appropriations Act Section 308 that

prohibited disposal of waste containing concentrations of plutonium "in excess of 20 percent by weight for the aggregate of any material category." This prohibition has appeared in subsequent appropriations acts, and is currently reiterated in Section 309 of the FY 2004 Appropriations Act (H.R. 2754).

Waste Material Parameters

The following are the waste material parameters included in this waste stream:

- Inorganic materials
  - Iron based metals/alloys (billet cans, slip-lid cans)
  - Other inorganic materials (ash, silica sand)
- Organic materials (such as plastics, paper, rubber, cloth, wood)
  - Plastics (waste material) used exclusively to bag out glovebox waste and for contamination control during and after bagging out waste.

The overall waste material parameter in the Hanford ash waste stream is other inorganic materials. This information has been confirmed using the visual examination (VE) technique during packaging of the waste for disposal.

Waste Packaging

Waste packaging for this waste stream complies with "TRUPACT-II Authorized Methods for Payload Control (TRAMPAC)" (Rev. 19c; Appendix 2.1, Section 2.1.2) and includes:

- Steel packaging material (55 gallon drum [Department of Transportation Specification 7A, Type A] with the inner pipe assembly for the POC)
- 110 mil plastic liner for the POC
- Fiberboard used as shock absorbing dunnage for the pipe component

Prior to final packaging for disposal at WIPP, the inventory of Hanford ash included 14 seven-inch cans and 109 lard cans containing approximately 498 inner seven-inch cans, for a total of 512 seven-inch cans. The 512 items (seven-inch cans) originally in the Nuclear Material Item Transfer inventory for Hanford ash amounted to less than 9 percent of the total historical inventory of Hanford ash (the remaining inventory had previously been processed for plutonium recovery). During this final packaging, the material was removed from feed cans, sieved (to homogenize the material and improve source geometry for measurements using nondestructive assay equipment), and loaded into billet cans. During sieving, physically similar surrogate materials were also mixed with the material to reduce the attractiveness (from a safeguards and security standpoint) of the materials. PFP personnel used non-radioactive and non-hazardous silica sand as the procedurally authorized surrogate for safeguards purposes (Sutter 2003a, U.S. Silica no date, Sutter 2003b). Only silica sand was used for repackaging the Hanford ash waste stream (Sutter 2003a, Schlegel 2000). Finally, the billet cans were bagged out of the glovebox, placed into POCs, assayed, and the layers of confinement recorded for each can.

There are four or less layers of confinement for this waste stream. The TRUCONs assigned to the waste are RH130E, RH130F, RH130G, and RH130H.

Prohibited Items

Hanford ash materials have been packaged into POCs in preparation for storage at the CWC. During packaging, the material was removed from feed cans, sieved, and loaded into billet cans. PFP personnel performed the Visual Examination (VE) technique at the time of packaging, in accordance with the Pipe-N-Go Operations procedure, to confirm the material parameters and waste matrix code, to confirm that there were no prohibited items, and to verify AK information regarding the waste stream.

The containers in this waste stream are packaged in accordance with WIPP Waste Analysis Plan (WAP) and Contact-Handled Waste Acceptance Criteria (CH-WAC) requirements to ensure the containers are certifiable for transportation and disposal. Container records have also been reviewed and VE technique was performed during packaging to confirm that this waste stream does not contain any of the following prohibited items:

- Liquids
- Corrosives
- Reactives
- Ignitables
- Pyrophorics
- Explosives
- Compressed gases
- Sealed containers >4 L
- Pressurized containers
- Non-mixed hazardous wastes
- Incompatible wastes

Waste Generating Process

The Contaminated Waste Recovery Facility (CWRF) (Building 232-Z) was designed to recover plutonium from glovebox and other debris generated primarily from the 234-5Z, Reduction Oxidation facility (REDOX, 233-S), and 231-Z Buildings. The CWRF performed the following essential functions related to this waste stream (Hoyt et al. 2000, HNF-5482):

- Manual sorting of glovebox debris into three categories
  - Plutonium-bearing materials suitable for incineration
  - Plutonium-bearing materials suitable for chemical rinsing and leaching
  - Materials with relatively low plutonium content suitable for discard

- Incineration of materials suitable for incineration

- Collection and packaging of the incinerator ash for plutonium recovery by dissolution and solvent extraction

A flow diagram of the CWRF incineration process is presented in Figure 1. During the CWRF operations, approximately 612 m^3 of material was fed to the CWRF for processing during the lifespan of the facility. Of this amount, an estimated 122 m^3 were processed through the incinerator (Hoyt et al. 2000).

Typical feed materials for the furnace included rags, paper, plastic, glove tips, cardboard, and wood. Plastics (including polyvinyl chloride, polyethylene, and polypropylene) were a significant component of the waste feed, although additional cardboard was added to the plastic feed to achieve a 50/50 mix to support combustion of the plastic (and other hard to burn materials). Atypical Pu-bearing feed materials, such as graphite (<1 percent in the resultant waste), hood sludge (generally consisting of dissolved rubber gloves, nitric acid, plutonium nitrate, plutonium oxide particles, carbon tetrachloride, and equipment corrosion products), asbestos, combustibles from a late 1963 REDOX fire/spill decontamination, and fabrication oil (also referred to as "fab oil," nonhazardous lard oil thinned with carbon tetrachloride), were infrequently processed through the incinerator. Because the incinerator was subject to numerous operational difficulties, and was exceedingly difficult to repair and operate, processing of unnecessary or unusual materials was avoided (Hoyt et al. 2000, Fluor Hanford 2001).

Potential feed materials were first sorted to remove items having relatively low plutonium content suitable for disposal and those items not suited for incineration (e.g., metal, glass). Feed materials for the incinerator were then processed through a mechanical chopper to reduce the incoming material to a small size that facilitated the combustion process. The chopped materials were directed into a bin, from which they were fed into the incinerator via a conveyor belt. Figure 2 presents a drawing of the CWRF incinerator.

The speed of the conveyor belt resulted in a typical 8 to 10 minute residence time in the furnace; however, residence time could be varied from 6 to 60 minutes by controlling the speed of the conveyor belt (Hoyt et al. 2000). Temperature in the primary combustion chamber was automatically controlled within a range of 700 to 800°C (Fluor Hanford 2001). As burning material added heat to the furnace, the heating elements would cycle on and off at the upper temperature limit to avoid failure of furnace materials that would occur at higher temperatures. Ash from the incinerator was collected in feed cans, packaged out after being allowed to cool, and stored in the vaults at the 2736-ZB Building for future recovery of the plutonium by dissolution and solvent recovery (Hoyt et al. 2000).

During the period at the time the ash was generated, container code numbers were assigned to the feed cans in such a way that the date of packaging could be determined. The bulk of the Hanford ash in the current inventory was generated during two major time periods: between mid-1964 and mid-1965 and between 1968 and 1969. A small amount of the inventory was generated during the 1962 to 1964 time frame when atypical feed materials were processed. Another small portion of the inventory was produced during the 1972 and 1973 time period when fab oil was processed. Based on an evaluation of the packaging records, the following numbers of feed cans were produced during periods of atypical feed incineration (Fluor Hanford 2001):

- 7 cans during the processing of sludge
- 16 cans during the processing of polyethylene sock filters
- 5 cans when graphite was in the feed
- 24 cans during the period when fab oil was present.

Plutonium recovery operations at Hanford ceased in 1985. The Hanford ash materials were subsequently declared to be waste and operations began in February 2001 to repackage the material as waste for disposal at the WIPP. The Hanford ash material has been packaged into billet cans and placed into POCs, as described, and the majority of the POCs have been transferred to the CWC for interim storage pending disposal.

Thermal Treatment of Waste Matrix

Section B-3a(1)(ii) of the WIPP Hazardous Waste Facility Permit NM4890139088-TSDF states that wastes may qualify for reduced headspace sampling, if the following criteria are met:

- The waste stream or waste stream lot must consist of more than 10 containers.

- The waste stream must have either been generated using a high-temperature thermal process or been subjected to a high-temperature thermal process after generation that resulted in the reduction of matrix-related volatile organic compounds (VOCs) in the headspace of the waste containers to concentrations below the program required quantitation limits in Permit Attachment B3, Table B3-2.

- The site must have documentation demonstrating that high-temperature thermal processes were used.

The Hanford ash waste stream will consist of 291 POCs, thereby meeting the first criterion. Volatile organic compounds are not present in this waste stream as they would have been volatilized or destroyed at the temperatures involved in thermal processing of the feed materials in the waste. Processing of waste materials occurred at temperatures of 700°C to 800°C and residence times of 6 to 60 minutes, resulting in the ash that makes up this waste stream (Hoyt et al 2000, Fluor Hanford 2001). As a result of this processing at elevated temperatures, VOCs are not expected to be present in the headspace gas of the POCs.

Details of these processes are well documented in the AK record; thus meeting the other criteria for eligibility. In addition, no organic materials or chemicals were introduced into the process following thermal treatment. The absence of organic compounds above the program required quantitation limits was verified by headspace gas sampling performed on 10 POCs of the waste stream. These POCs were randomly selected from the entire population of Hanford ash POCs using the techniques presented in Section B2-2b of the WIPP WAP. Therefore, the Hanford ash waste is eligible for reduced headspace gas sampling as waste from a high-temperature thermal process (M4T00-DCD-03-074).

RCRA Hazardous Waste Determination

In accordance with acceptable knowledge procedures, the U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) hazardous waste numbers (HWNs) assigned to the Hanford ash waste stream are based on a review of incinerator feed materials that included combustibles and plastics. During this review, it was determined that certain toxicity characteristic metals may have been present in the incinerator feed materials. Because these metals would have been concentrated by volume reduction during the incineration

process, the appropriate HWNs have been conservatively assigned to the waste stream. The following discussions present an overview of available information for each parameter of interest.

During solids sampling and analysis conducted on the Hanford ash waste stream, a single sample was identified as containing a tentatively identified compound. This compound was identified as bis(2-ethylhexyl) phthalate (Chemical Abstract Services [CAS] number 117-81-7) at a concentration of 1.3 mg/kg. However, this analyte did not appear in more than 25 percent of the containers analyzed and thus will not be added to the list of standard analytes for the waste stream.

Characteristic of Ignitability

Based on the management history and EPA guidance, the Hanford ash waste stream does not meet the definition of ignitability as defined in 40 CFR 261.21. The materials are not liquid and the VE technique was performed during packaging to ensure liquids are not present in or added to the containers. Additionally, because the material was processed through an incinerator, all ignitable materials that may have been in the waste have been stabilized and are no longer ignitable. This material will not cause fire through friction, absorption of moisture, or spontaneous chemical changes. This material is not a compressed gas as defined in 49 CFR 173.151. This material is not an oxidizer as defined in 49 CFR 173.300. The materials in this waste stream are therefore not ignitable wastes (D001).

Characteristic of Corrosivity

The materials in this waste stream do not meet the definition of corrosivity as defined in 40 CFR 261.22. The materials are not liquid and the VE technique was performed during packaging to ensure liquids are not present in the containers. The materials in this waste stream are therefore not corrosive wastes (D002).

Characteristic of Reactivity

Based on the management history and EPA guidance, the Hanford ash waste stream does not meet the definition of reactivity as defined in 40 CFR 261.23. Based on experience with the materials, the ash is stable and will not undergo violent chemical change. The materials will not react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors, or fumes when mixed with water. The materials do not contain cyanides or sulfides, and are not capable of detonation or explosive reaction. Additionally, because the material was processed through an incinerator, all reactive materials that may have been in the waste have been stabilized and are no longer reactive. The VE technique was performed to ensure reactive materials are not added to containers during packaging. The materials in this waste stream are therefore not reactive wastes (D003).

Toxicity Characteristic

Based on a review of AK for Hanford ash, the ash is likely to contain constituents (i.e., barium, cadmium, chromium and lead) regulated as toxic metals according to 40 CFR 261.24. Accordingly, EPA HWNs assigned to the Hanford ash waste stream based on AK are D005, D006, D007, and D008 (Fluor Hanford 2001). These metals were expected contaminants in the

Pu product and in feed material for the incinerator. Because the incineration process reduces the volume of waste materials, these metals would become concentrated in the ash.

Based on limited solids sampling and analytical data for the waste stream, the 90th percentile upper confidence limit (UCL_{90}) for silver was found to exceed the program required quantitation limit. As a result, the corresponding HWN, D011, was also assigned to the Hanford ash waste stream.

Toxicity characteristic organics, such as pesticides, herbicides, and semi-volatiles, were not included in any part of the plutonium processing operation and are not expected to be present in the ash. In addition, thermal processing of the materials during incineration would have destroyed any other organic compounds present; therefore no TC characteristic organic codes apply. No hazardous constituents were introduced during packaging of the ash materials for shipment to WIPP. Therefore, this waste stream does not exhibit the characteristic of toxicity for RCRA organics (D012 – D043).

Listed Waste Codes

Although fab oil was occasionally processed through the incinerator, the carbon tetrachloride in the oil was added to the oil as a thinning agent. Because the carbon tetrachloride was used as a thinner, rather than as a degreaser, there is no reason to assign the F001 HWN to the fab oil or resulting ash. In addition, the temperature and residence times associated with the Building 232-Z incinerator were such that fab oil constituents would have been destroyed during processing (Hoyt et al. 2000).

Combustibles fed to the incinerator may have been contaminated with beryllium and therefore, residual quantities of beryllium (less than one percent by weight) may be present in the ash waste stream. However, the beryllium is not unused commercial chemical product, and therefore is not a P015-listed waste. None of the materials in this waste stream are from the specific sources listed in 40 CFR 261.32 as discarded commercial products (e.g., U134 hydrofluoric acid), off-specification species, container residues (from a RCRA standpoint), or a spill residue. Therefore, no container in this waste stream exhibits listed waste codes (P, U, K, and F codes) per 40 CFR 261.31 - 261.33.

Washington State Toxic and Dangerous Waste Codes

Washington State Toxic

Washington (state) Administrative Code (WsAC) 173-303-100(5) describes the approach for evaluating a toxic constituent(s) to determine whether the code for a Washington Toxic Waste should be assigned to the waste. This approach uses a formula that considers the sum of the dose concentrations associated with the various constituents in the waste. Based on available toxicity information and preliminary sampling results (for concentrations of these constituents in the ash), state-specific toxic waste codes were not required to be assigned to the waste.

Washington State Dangerous Waste

The ash materials include metal oxides and possibly metal hydroxide salts. Based on procedures presented in WsAC 173-303-090(6)(a)(iii), if the ash materials were mixed with an equal amount

of water, the resultant pH may be 12.5 or greater. Therefore, in accordance with WsAC 173-303-090(6)(a)(iii), the Washington State code assigned to this waste stream is WSC2.

WSC2 is a state code that identifies solid corrosive materials. WSC2 is a solid or semi-solid, and when mixed with an equal weight of water results in a solution, the liquid portion of which has a pH less than or equal to 2, or greater than or equal to 12.5. This is different than D002 as defined by RCRA 40 CFR 261.22 because the RCRA definition of corrosive waste applies only to liquid wastes. WSC2 is defined in Dangerous Waste Regulations, Chapter 173-303 WsAC.

Toxic Substances Control Act-Regulated Constituents

Based on acceptable knowledge, this waste stream does not contain any chemicals regulated by the Toxic Substances Control Act (TSCA) (i.e., polychlorinated biphenyls [PCBs]). PCBs are not present in the waste.

Records indicate that asbestos was present in one batch of ash (Hoyt et al. 2000). There is no indication that asbestos is present in the remainder of the waste stream.

Radionuclides

The radionuclides that are expected to be in this waste stream include plutonium (Pu-238, 239, 240, 241, and 242) and americium 241 (Am-241). The plutonium is mostly weapons grade, but also contains some fuels grade plutonium. Other radionuclides expected in trace quantities in this waste stream are cesium-137 (Cs-137), strontium-90 (Sr-90), uranium-233 (U-233), uranium-234 (U-234), uranium-235 (U-235), and uranium-238 (U-238).

Additional acceptable knowledge information was obtained for strontium-90 and uranium-234 to comply with CH-WAC requirements. Acceptable knowledge was used to quantify the amount of Sr-90 and U-234 expected in the waste stream. Scaling factors were determined or developed using historical data. The scaling factors for the following activity relationships are as follows (Clinton 2002a, 2002b, and 2002c):

- U-234/U-235 $\simeq$ 30
- U-234/U-238 $\simeq$ 2
- Cs-137/Sr-90 $\simeq$ 1.1

Defense Waste Determination

The Department of Energy (DOE) and its predecessor agencies were engaged in a broad range of activities that fall under the heading of atomic energy defense activities. These activities include:

- Naval reactors development
- Weapons activities, including defense inertial confinement fusion
- Verification and control technology
- Defense nuclear materials production

- Defense nuclear waste and materials by-product management
- Defense nuclear materials security and safeguards and security investigations
- Defense research and development

A review of acceptable knowledge reference sources (Hoyt et al. 2000, Fluor Hanford 2002, and Lini 2003) indicates that this waste stream is the result of weapons activities, specifically defense nuclear materials production and defense nuclear waste and materials by-product management. Materials processed through the CWRF incinerator were contaminated with plutonium as a result of plutonium processing and recovery activities. Candidate materials for the incinerator included primarily solid waste produced at PFP (234-5Z Building) and the 231-Z facility; however, solid combustibles from Pu nitrate spill decontamination activities at the REDOX and the Plutonium-Uranium Extraction Plant (PUREX) were also processed in the CWRF incinerator for plutonium recovery (Hoyt et al. 2000).

The Hanford Site has primarily been used to produce plutonium metal and plutonium oxides to support national defense activities. Within Hanford, the PFP complex housed the final stage operations, including plutonium metal production from plutonium nitrate solutions, for processing of plutonium for use in the weapons program. The plutonium nitrate feed materials used by the PFP came primarily from the PUREX, at which plutonium was extracted from defense reactor fuel and plutonium scrap materials. The source of the PFP feed from the PUREX and Hanford defense production reactors qualifies the Hanford ash waste stream to be disposed of at WIPP as defense waste.

Reference List:

1. HNF-3461, "Hanford Site Transuranic Waste Management Program Acceptable Knowledge Document for Retrievably Stored Contact-Handled Waste," Rev. 7, June 17, 2002.
2. M4T00-TRU-03-534, "Transmittal of the West Stream-Specific Document MHASH01 Revision 3 for the Acceptable Knowledge Documentation Management Program for the Hanford Incinerator Ash, Waste Stream MHASH01," December 2, 2003.
3. HNF-5482, "Hanford Site Transuranic Waste Management Waste Specific Acceptable Knowledge Documentation for Plutonium Finishing Plant," Rev. 8, December 12, 2003.
4. Hoyt, R., T. Venetz, J. Teal, and D. Lini (2000), "General Description and Characterization of Hanford Generated Ash Residue"
5. Fluor Hanford (2001), "Waste Designation for Hanford Ash"
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7. Lini, D.C., (2003), "Origin of Plutonium"
8. Sutter, C.S., (2003a), "Graphite Surrogate
9. Sutter, C.S., (2003b), "RFETS Ash Surrogate Materials"
10. U.S. Silica, (no date), "Material Safety Data Sheet"
11. Schlegel, S.C., (2000), "Approval of New Surrogate Material for Pipe-&-Go"
12. "TRUPACT-II Authorized Methods for Payload Control (TRAMPAC)," Rev. 19c
13. Clinton, R. (2002a), "Sr-90/Cs-137 Determination"
14. Clinton, R. (2002b), "U234 to U235 and U234 to U238 Ratios for Appendix E of Hanford Site Transuranic Waste Certification Plan for NDA"
15. Clinton, R. (2002c), "Sr-90 to Cs-137 Ratio for Appendix E of Hanford Site Transuranic Waste Certification Plan for NDA"
16. M4T00-DCD-03-074, "Transmittal of the Random Selection of Containers for Reduced Headspace Gas Sampling and Analysis Campaigns for Waste Streams Rocky Flats Ash, RFETS01, Sand Slag and crucible, SS&C01, and Hanford Ash, MHASH01," April 9, 2003.

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1. HNF-3461, "Hanford Site Transuranic Waste Management Program Acceptable Knowledge Document for Retrievably Stored Contact-Handled Waste," Rev. 7, June 17, 2002.
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16. M4T00-DCD-03-074, "Transmittal of the Random Selection of Containers for Reduced Headspace Gas Sampling and Analysis Campaigns for Waste Streams Rocky Flats Ash, RFETS01, Sand Slag and crucible, SS&C01, and Hanford Ash, MHASH01," April 9, 2003.

Figure 1. Building 232-Z Building Incinerator Process

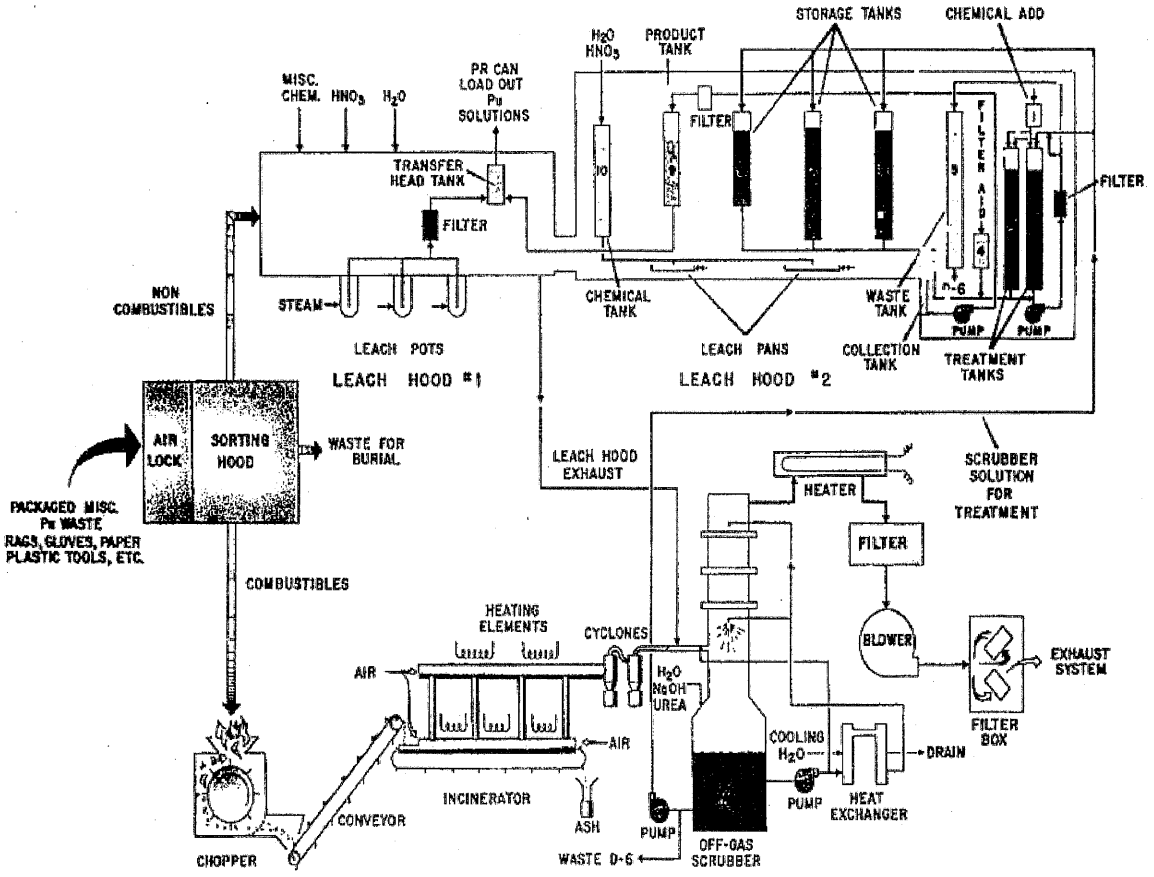

Figure 2. CWRF Incinerator